Radiometric Dating & Absolute Time

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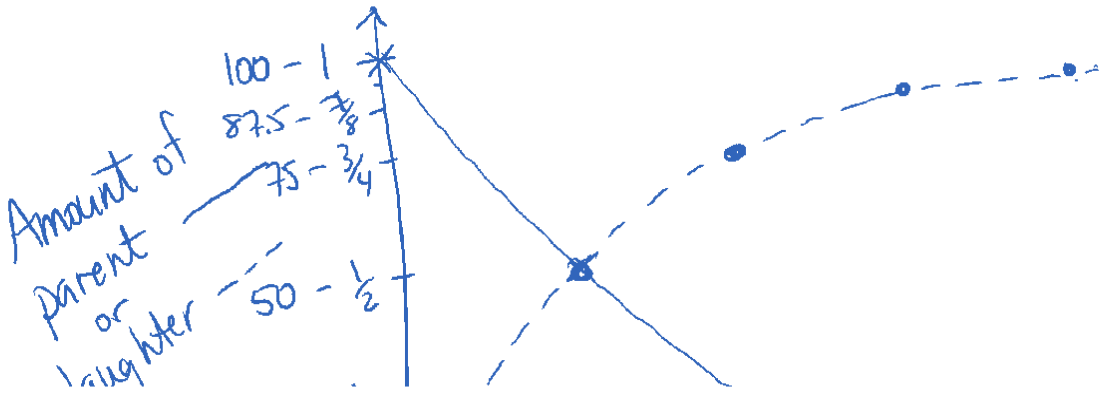
only works for igneous rocks; find out how long ago they cooled.

- radioactive elements (Uranium 238 ← (atomic mass 238 x mass of H)) constantly "decay" (emit alpha, beta and gamma) to form other elements ($U^{238} \longrightarrow Pb^{206}$, Pb^{206} ↑ stable) until there is no radioactive element left.
- radioactive elements decay at constant, individual rates
- half-life - the time it takes for half the atoms to convert to the stable end product

ex U^{238} (↑ radioactive parent) decays half of the atoms in 4.5 billion years, the other half becomes Pb^{206} (↑ stable daughter)

ex C^{14} has a half-life of 5730 years, in which time half becomes N^{14}

1 kg U^{238} —(1 half-life, 4.5 b.y.)→ $\frac{1}{2}$ kg U^{238}, $\frac{1}{2}$ kg Pb^{206} —(1 half-life, 4.5 b.y.)→ $\frac{1}{4}$ kg U^{238}, $\frac{3}{4}$ kg Pb → $\frac{1}{8}$ kg U, $\frac{7}{8}$ kg Pb → $\frac{1}{16}$ kg U, $\frac{15}{16}$ kg Pb



Age = # of half-lives × length of a half-life

get # of half-lives by comparing how much parent and daughter there is.

Other methods to measure absolute time:

- count tree rings - 1 ring = 1 year
- count varves - a layer of sediment is deposited each year at the bottom of a glacial lake.